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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/938,528	08/27/2001	Koji Arita	740-819-634	2800

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EXAMINER

BLUM, DAVID S

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/938,528

Applicant(s)

ARITA ET AL.

Examiner

David S Blum

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

This action is in response to Amendment B, paper #11, filed 1/13/03.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Razouk (US005581110A) in view of Schwalke (US005416041A).

Razouk teaches all of the positive steps of claims 1 and 4-5 except for forming the second and third insulating layers of silicon dioxide and forming a plurality of trenches (grooves) per element formation.

Razouk teaches a semiconductor layer (layers 106 and 108) are formed on first insulating film (104) and element-isolating groove (302) extends to the first insulating film. A thin oxide film (602) is formed by oxidizing the semiconductor layer at a wall surface of the groove (column 4 lines 35-40 and figure 6) as in claim 4. the oxide layer is 500 angstroms as in claim 5. A second insulating layer (702) is formed in the groove to cover the oxide layer 602 (as in claim 4) so as to partially fill the trench (figure 7). The second insulating layer is formed by a vapor deposition method (column 4 lines 65-67). An embedded layer (802) is formed on the second insulating layer so as to completely

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fill the trench (figure 8). A third insulating film (1302) is formed on the embedded layer (figure 13) using a vapor deposition method (column 6 lines 57-59). The background of the invention (column 1 lines 10-11) recites "The present invention relates to the fabrication of integrated circuits having trenches,". Thus Razouk anticipates a plurality of trenches separating devices. Thus one in the art would recognize Razouk as having another isolation groove adjacent the first groove in an area that is not an element formation region (using isolation trenches to isolate device elements, conventional practice (column 1 line 23)). As Razouk teaches covering the trench with layer 1302, it is obvious that the second trench would be covered also, the trenches being continuously covered.

Razouk forms the second (702) and third (1302) insulating layers of silicon nitride. Schwalke forms a similar structure with semiconductor layer (3) on a first insulating layer (2), a trench (groove) formed to the first insulating film, a second insulating film (10) partially filling the trench, an embedded layer (11) on the second insulating film and a third insulating film (12) on the embedded layer. The second and third insulating layers of Schwalke are silicon dioxide (column 5 lines 42-43 and column 6 lines 1-2). The purpose of the second and third insulating layers of Razouk and Schwalke are to reduce the stress of the insulation structure (Razouk abstract, Schwalke column 2 lines 4-6 and 34-36).

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Razouk does not teach a plurality of trenches (grooves) per element formation, referring to trenches and devices in the plural form. Schwalke teaches that trenches (plural) surround the respective component or component group (column 1 lines 16-20).

It would be obvious to one skilled in the requisite art at the time of the invention to modify Razouk by substituting silicon dioxide for silicon nitride as the second and third insulating layers to produce an insulating structure with reduced stress (Razouk abstract, Schwalke column 2 lines 4-6 and 34-36).

Response to Arguments

3. Applicant's arguments filed 06/09/03 have been fully considered but they are not persuasive. The applicant argues that none of the cited references teach a plurality of isolation grooves (trenches) for each element formation (device). However, Schwalke teaches that trenches (plural) surround the respective component or component group (column 1 lines 16-20).

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (703)-306-9168 and e-mail address is David.blum@USPTO.gov.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (703)-308-4940. Our facsimile number for Before-Final Communications is (703)- 872-9318 and for After-Final Communications is (703)- 872-9319. The facsimile number for customer service is (703)-872-9317. Our receptionist's number is (703)-308-0956.

David S. Blum

July 3, 2003


CARL WHITEHEAD, JR.
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